

INTERIM DIRECTIVE ON MANUFACTURED PANELS AND BRACE FRAMES BY HARDY FRAMES

Background

ICC-ES published the acceptance criteria for cold-formed steel shear panels (AC 322-07) last October 2007. However, shear panels and brace frames by Hardy Frames are not approved by ICC-ES as alternatives to light-framed shear walls described in the 2006 International Building Code (IBC) and 2007 California Building Code (CBC). The City of San Jose Building Division engineers have reviewed the most recent test data under the recently adopted acceptance criteria (AC 322-07) to determine the allowable load tables of Hardy Frame panels and brace frames for use in structures designed under the 2007 CBC.

Guidelines for Design, Plan Check and Field Inspection

Until evaluated using recently published criteria and approved for use under the 2006 IBC by ICC-ES, Hardy Frame panels and brace frames may be used as alternatives to light-framed shear walls in the City of San Jose only when the following criteria are met:

1. Only the "X Series" models listed on attached Table 1-SJ, Table 2-SJ, and Table 3-SJ are allowed to be used in light-framed construction.
2. Hardy *brace frames* shall be installed directly on concrete foundation without mud sill, raised floor framing, or cripple walls.
3. Hardy *panels* are allowed to be installed on concrete foundation without mud sill or on raised floor framing. When used on raised floor framing, Installation of Hardy panels shall be in accordance with all the requirements listed below:
 - Raised floor framing under Hardy panel shall have a single 4x or 6x rim and a single 3x sill plate sitting directly on concrete foundation;
 - The 4x or 6x rim shall be of Structural Composite Lumber (SCL) with the moisture content of not more than 16% at the time of installation;
 - Both 4x or 6x rim and 3x sill plate shall continue at least 12" beyond each side of the Hardy panel except around the outside corner of a building, where Hardy panels shall be installed a minimum of 3" away from the end of the wall;
 - No cripple wall is allowed under Hardy panels.
4. For 1-story conventional light-framed construction, Hardy panels and brace frames may be allowed as alternative bracing panels sitting on concrete foundation or raised floor framing, if the panel or brace frame is 18" or wider.

5. Balloon framed Hardy Frame panels or brace frames are not allowed regardless of the foundation system used.
6. Double panels or brace frames (back-to-back) are not allowed at any location or along any braced wall line.
7. Max. 8" tall filler may be allowed between double top plates and Hardy panels/brace frames if appropriate attachment details are designed by the engineer of record and approved by the City. When the filler is thicker than 1.5", the allowable values of the next panel height shall be used for the design. The filler/header installed on top of Hardy panels/brace frames shall be of Structural Composite Lumber (SCL) with a moisture content of not more than 16% at the time it is fastened to the panels.
8. The allowable loads of Hardy Frames panels and brace frames shall be determined from the attached Table 1-SJ, Table 2-SJ, and Table 3-SJ. The allowable shear capacity shall be reduced in proportion to the actual tension capacity of hold-down bolts based on reduced edge and/or end distances and the actual strength of the concrete foundation.
9. Neither Hardy Frame panels nor brace frames shall be used for the design of buildings of occupancy category III and IV per Table 1604.5 of the 2007 CBC.
10. $R=6.5$ may be used for the design of manufactured Hardy Frame panels and brace frames in the direction considered. When Hardy brace frames/panels are used in line with other types of shear panels, only one type of panels shall be considered as the lateral resistance element along such wall line. The design shall be governed by whichever has the lowest allowable shear capacity and "R" value.
11. Except for one-story conventional construction, the Engineer of Record shall check:
 - Concrete foundation/grade beam capacity and soil bearing pressure under coupled tension and compression load at ends of Hardy Frame panels or brace frames.
 - Tension capacity of hold-down bolts based on reduced edge and end distance as detailed on the plans.
12. All installations shall use respective manufacturer's approved templates, and follow the installation details and instructions listed on sheets HF1-SJ, HF2-SJ, and HF3-SJ.
13. This directive will be effective starting May 21, 2008, and subject to reevaluation after December 31st, 2008.

Approved by



Edward Tolentino
Chief Building Official

Table 1-SJ: 2006 IBC *Hardy Frame*[®] **X-Series** Panels - on FOUNDATIONS^{1, 9}

5-8-2008

Model Number	Net Height H (in)	HD Bolt Dia. (in)	V - Seismic Governs			V - Wind Governs			Screw Qty ^{6, 7} at Top	Add'l ⁸ Vertical Load P _{seismic} (lbs)	Add'l ⁸ Vertical Load P _{wind} (lbs)
			Allowable ^{2, 3} In-Plane Shear V (lbs)	Drift ⁵ at V (in)	Uplift ^{4, 5} at V (lbs)	Allowable ² In-Plane Shear V (lbs)	Drift ⁵ at V (in)	Uplift ^{4, 5} at V (lbs)			
12" Wide Panels											
HFX12x78-1 1/8	78"	1 1/8	1,277	0.20	9,712	1,284	0.20	9,775	4	4,000	4,000
HFX12x8-1 1/8	92-1/4"	1 1/8	1,079	0.27	9,708	1,086	0.28	9,775	4	4,000	4,000
HFX12x9-1 1/8	104-1/4"	1 1/8	956	0.35	9,726	961	0.35	9,775	4	2,000	2,000
HFX12x10-1 1/8	116-1/4"	1 1/8	859	0.43	9,739	862	0.43	9,775	4	1,000	1,000
18" Wide Panels											
HFX18x78-1 1/8	78"	1 1/8	2,945	0.19	14,137	2,938	0.19	14,137	9	4,000	4,000
HFX18x8-1 1/8	92-1/4"	1 1/8	2,487	0.26	14,119	2,487	0.26	14,119	8	4,000	4,000
HFX18x9-1 1/8	104-1/4"	1 1/8	2,202	0.33	14,130	2,202	0.33	14,130	7	4,000	4,000
HFX18x10-1 1/8	116-1/4"	1 1/8	1,975	0.41	14,126	1,975	0.41	14,126	6	4,000	4,000
HFX18x11-1 1/8	128-1/4"	1 1/8	1,790	0.50	14,128	1,836	0.50	14,128	6	4,000	4,000
HFX18x12-1 1/8	140-1/4"	1 1/8	1,641	0.60	14,162	1,641	0.60	14,162	5	4,000	4,000
HFX18x13-1 1/8	152-1/4"	1 1/8	1,508	0.71	14,129	1,508	0.71	14,129	5	4,000	4,000
24" Wide Panels											
HFX24x78-1 1/8	78"	1 1/8	4,358	0.11	15,276	4,358	0.11	15,276	13	4,000	4,000
HFX24x8-1 1/8	92-1/4"	1 1/8	3,685	0.14	15,278	3,685	0.14	15,278	11	4,000	4,000
HFX24x9-1 1/8	104-1/4"	1 1/8	3,261	0.18	15,278	3,261	0.18	15,278	10	4,000	4,000
HFX24x10-1 1/8	116-1/4"	1 1/8	2,924	0.22	15,275	2,924	0.22	15,275	9	4,000	4,000
HFX24x11-1 1/8	128-1/4"	1 1/8	2,651	0.27	15,279	2,651	0.27	15,279	8	3,000	3,000
HFX24x12-1 1/8	140-1/4"	1 1/8	2,422	0.32	15,264	2,422	0.32	15,264	7	3,000	3,000
HFX24x13-1 1/8	152-1/4"	1 1/8	2,232	0.38	15,276	2,232	0.38	15,276	6	1,000	1,000

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

Notes:

- 1) Installation on Concrete Foundations only.
- 2) 1.33 increase **IS NOT ALLOWED** for the loads shown.
- 3) For seismic loads under the 2006 IBC or 2007 CBC (California Building Code) R=6.5, $\Omega_o = 3$ and $C_d = 4$.
- 4) The uplift values listed are those corresponding to the allowable shear V.
- 5) For reduced shear loading the uplift and drift are proportionately reduced.
- 6) The 1/4-inch diameter by 3-inch long wood screws are Hardy Frame HFS-series, USP WS-series (ICC-ES ECR-5634) or equal.
- 7) When installing a 2-by wood filler (specific gravity of 0.5 or greater) at the top connection, the minimum screw length is 4-1/2 in.
- 8) Load P indicates maximum allowable vertical load (assuming a uniform distribution) permitted on top of Panel in addition to the vertical load produced by overturning at the allowable shear V.
- 9) Hold downs are ASTM A36 (minimum) and the 5/8 x 10 Anchor Bolt at the 24" Panel is ASTM A307 (minimum)

Design Loads in this table have been reduced by 15% to meet the requirements of the City of San Jose Building Department.

Table 2-SJ: 2006 IBC *Hardy Frame*® X-Series Panels - on Raised Floor^{1, 2, 11}

5-8-2008

Model Number	Net Height H (in)	HD Bolt Dia. (in)	V - Seismic Governs			V - Wind Governs			Screw Qty ^{8,9} at Top	Screw Qty ^{8,9} at Bottom	Add'l ¹⁰ Vertical	Add'l ¹⁰ Vertical
			Allowable ^{3,4} In-Plane Shear V (lbs)	Drift ^{5,7} at V (in)	Uplift ^{6,7} at V (lbs)	Allowable ³ In-Plane Shear V (lbs)	Drift ^{5,7} at V (in)	Uplift ^{6,7} at V (lbs)			P _{seismic} (lbs)	P _{wind} (lbs)
12" Wide Panels												
HFX12x78-1 1/8	78"	1 1/8	893	0.35	6,801	1,226	0.40	9,330	3	4	4,000	2,600
HFX12x8-1 1/8	92-1/4"	1 1/8	720	0.42	6,480	985	0.48	8,866	3	4	4,000	2,600
HFX12x9-1 1/8	104-1/4"	1 1/8	592	0.46	6,021	826	0.53	8,400	3	4	2,000	1,300
HFX12x10-1 1/8	116-1/4"	1 1/8	494	0.51	5,601	704	0.58	7,981	3	4	1,000	650
18" Wide Panels												
HFX18x78-1 1/8	78"	1 1/8	2,062	0.28	9,896	2,962	0.33	14,137	7	9	4,000	4,000
HFX18x8-1 1/8	92-1/4"	1 1/8	1,741	0.36	9,884	2,487	0.43	14,119	6	8	4,000	4,000
HFX18x9-1 1/8	104-1/4"	1 1/8	1,542	0.43	9,890	2,202	0.51	14,130	5	7	4,000	4,000
HFX18x10-1 1/8	116-1/4"	1 1/8	1,363	0.50	9,747	1,975	0.60	14,126	5	6	4,000	4,000
HFX18x11-1 1/8	128-1/4"	1 1/8	1,146	0.55	9,040	1,709	0.67	13,494	5	6	4,000	3,250
HFX18x12-1 1/8	140-1/4"	1 1/8	976	0.60	8,422	1,476	0.73	12,742	4	5	4,000	2,600
HFX18x13-1 1/8	152-1/4"	1 1/8	845	0.65	7,916	1,292	0.79	12,108	4	5	4,000	2,600
24" Wide Panels												
HFX24x78-1 1/8	78"	1 1/8	3,051	0.17	10,694	4,358	0.20	15,276	10	13	4,000	3,250
HFX24x8-1 1/8	92-1/4"	1 1/8	2,580	0.21	10,694	3,685	0.25	15,278	8	11	4,000	3,250
HFX24x9-1 1/8	104-1/4"	1 1/8	2,282	0.25	10,694	3,261	0.30	15,278	7	10	4,000	3,250
HFX24x10-1 1/8	116-1/4"	1 1/8	2,047	0.29	10,694	2,924	0.35	15,275	7	9	4,000	2,600
HFX24x11-1 1/8	128-1/4"	1 1/8	1,856	0.34	10,697	2,651	0.41	15,279	6	8	3,000	1,950
HFX24x12-1 1/8	140-1/4"	1 1/8	1,695	0.39	10,685	2,422	0.47	15,264	5	7	3,000	1,950
HFX24x13-1 1/8	152-1/4"	1 1/8	1,563	0.44	10,696	2,232	0.53	15,276	5	7	1,000	650

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

Notes:

- 1) Raised Floor requires minimum 3-by sill plate, 4x Engineered Wood rim and Hardy Frame Bearing Plate installed below Panel.
- 2) When seismic governs and Raised Floor conditions are different than described above, shrinkage and crushing must be considered to verify that the corresponding drift is within the code limits.
- 3) 1.33 increase **IS NOT ALLOWED** for the loads shown.
- 4) For seismic loads under the 2006 IBC or 2007 CBC (California Building Code) $R=6.5$, $\Omega_o=3$ and $C_d=4$.
- 5) Drift at Allowable Shear V considers shrinkage and crushing of wood members. Shrinkage is based on a 7% change in moisture content. Compression is based on F_c of 680 psi and a compression load equal to the uplift.
- 6) The uplift values listed are those corresponding to the allowable shear V.
- 7) For reduced shear loading the uplift and drift are proportionately reduced.
- 8) The 1/4-inch diameter by 3-inch long wood screws are Hardy Frame HFS-series, USP WS-series (ICC-ES PFC-5634) or equal.
- 9) Minimum screw length is 3-inches at the top and 4-1/2 inches at the bottom connection. When installing a 2-by wood filler (specific gravity of 0.5 or greater) at the top connection, the minimum screw length is 4-1/2 inches.
- 10) Load P indicates maximum allowable vertical load (assuming a uniform distribution) permitted on top of Panel in addition to the vertical load produced by overturning at the allowable shear V.
- 11) Hold downs are ASTM A36 (minimum).

Design Loads in this table have been reduced by 15% to meet the requirements of the City of San Jose Building Department.

Table 3-SJ: 2006 IBC *Hardy Frame*® **X-Series** Brace Frames - on FOUNDATIONS ^{1, 10} 5-8-2008

Model Number	Net Height H (in)	HD Bolt Dia. (in)	V-Seismic Governs			V-Wind Governs			Screw Qty at Top	Add'l Vertical Load W (plf)	Add'l Vertical Load P (lbs)
			Allowable ^{2,3} In-Plane Shear V (lbs)	Drift ⁵ at V (in)	Uplift ^{4,5} at V (lbs)	Allowable ² In-Plane Shear V (lbs)	Drift ⁵ at V (in)	Uplift ^{4,5} at V (lbs)			
32" Wide Brace Frames											
HFX32x8	92-1/4"	7/8	2,461	0.15	7,503	2,461	0.15	7,503	12	1,500	4,000
HFX32x9	104-1/4"	7/8	2,329	0.21	8,026	2,329	0.21	8,026	11	1,500	4,000
HFX32x10	116-1/4"	7/8	2,087	0.25	8,020	2,087	0.25	8,020	10	1,500	4,000

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

Notes:

- 1) Installation on Concrete Foundations only.
- 2) 1.33 increase **IS NOT ALLOWED** for the loads shown.
- 3) For seismic loads under the 2006 IBC or 2007 CBC (California Building Code) $R=6.5$, $\Omega_o = 3$ and $C_d = 4$.
- 4) The uplift values listed are those corresponding to the allowable shear V.
- 5) For reduced shear loading the uplift and drift are proportionately reduced.
- 6) The 1/4-inch diameter by 3-inch long wood screws are Hardy Frame HFS-series, USP WS-series (ICC-ES PFC-5634) or equal.
- 7) When installing a 2-by wood filler (specific gravity of 0.5 or greater) at the top connection, the minimum screw length is 4-1/2 in.
- 8) Loads "W" & "P" indicate the maximum allowable vertical load permitted on top of Brace Frames, in addition to the vertical load produced by overturning at the maximum Allowable Shear V.
- 9) Loads "W" & "P" can act concurrently provided that the actual total load resultant does not exceed "P".
- 10) Hold downs are ASTM A36 (minimum).

Design Loads in this table have been reduced by 30% to meet the requirements of the City of San Jose Building Department.

REVISIONS	DATE

PANELS—Typical Foundation Details

Hardy Frame® Installation

- Step 1: Concrete Preparation**
- Concrete contractor should use Hardy Frame Templates to accurately place embed bolts and Hardy Frame Bolt Braces to prevent sway.
 - Attach single use (HFXT) Templates to a formboard at locations specified on plans. Bolt Braces (HFXB) connect at the embed and end of the hold down bolts.
 - At interior footings Templates may be secured in place using stakes.
 - Footing design, embed depths and bolt edge/end distances are per the designer of record.
 - Determine if the Hardy Frame will be installed on concrete or a mudsill and refer to details for recommended height of bolt above finish concrete

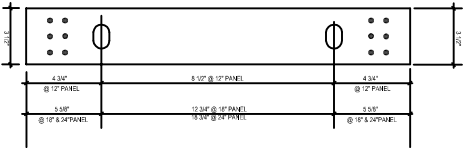
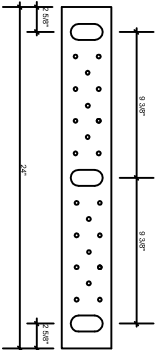
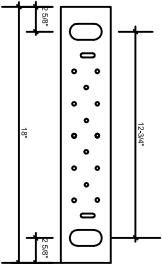
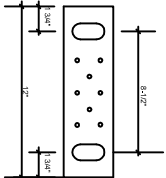
Step 2: First Floor Installation on Concrete

- Installation of a moisture barrier, such as Moistop or 15# felt is recommended under the Frame.
- Set the Hardy Frame over the embed bolts.
- HD bolts require Hardened Round (Afr. 2 EA Flat or SAE) Washers and nuts. Tighten nuts until snug tight.
- After framing and plumb & line are complete, place a 2x filler above the top of the Frame, through the filler and into the double top plates or header above. For fillers larger than 1–1/2" net, refer to detail 3–HF2.

Step 3: Installation on Raised Floor Systems – Panel on Hardy Frame Bearing Plate (See Hardy Frame page HF2-SJ)

- Install a solid 4x or 6x rim in the floor system below the Panel. Structural composite lumber required.
- Hold the floor sheathing and screw each end of the Hardy Frame Bearing Plate directly to the rim below with 1/4"x3" (min) screws per schedule. If the rim is 4x, add a 2x ledger to allow for boundary nailing of floor sheathing.
- Install the Panel directly on the Bearing Plate.
- Use all thread to connect the bottom corners to a Panel, Frame or Post below per Details. Nuts to be snug tight.
- If necessary, install 1/4"x4 1/2" (min) screws through the Panel base, through the Bearing Plate and penetrating the rim below.
- After framing and plumb & line are complete, place a 2x filler above the Frame to make up the height difference created by eliminating the bottom plate, and connect with 1/4"x4–1/2" screws through the top of the Frame, through the filler and into the double top plates or header above. For fillers larger than 1–1/2" net, refer to detail 3–HF2

Note: Installation methods may vary due to job conditions and/or specifications by the registered design professional.



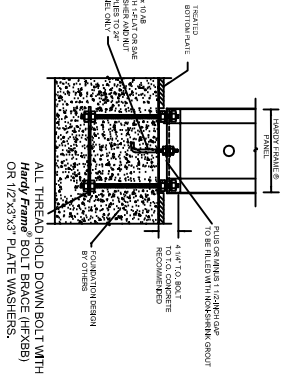
3/4"x3 1/2"x16" 24" or 30"
MINIMUM CLEARANCE WIDTH OF PANEL
BEING INSTALLED.

HARDY FRAME BEARING PLATE (HFXP)

HFXT

HF2-SJ

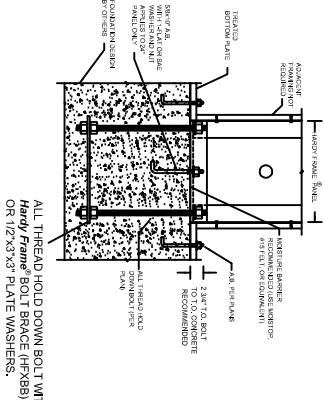
FIGURE 1 OF RECORD IS PREPARED TO ACCOMPANY THIS
DETAIL TO ACCOMMODATE A SPECIFIC CONDITION



HARDY FRAME® ON NUTS & WASHERS "DOUBLE NUT"
ALLOW VALUES PER TABLE 1-SJ

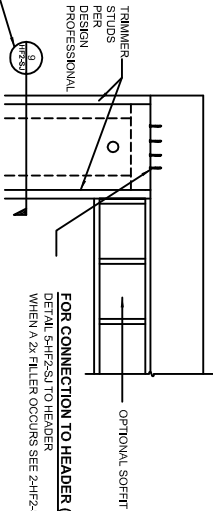
HF2

FIGURE 2 OF RECORD IS PREPARED TO ACCOMPANY THIS
DETAIL TO ACCOMMODATE A SPECIFIC CONDITION

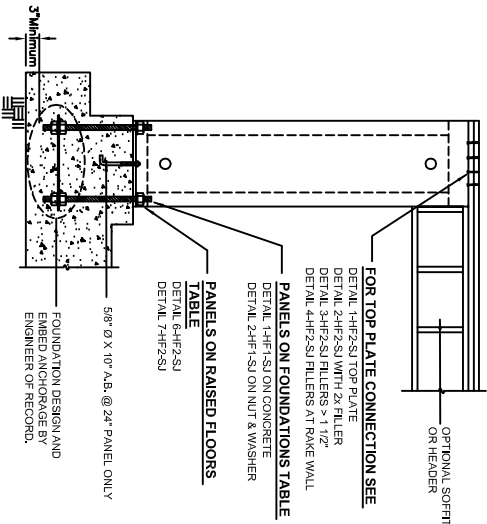


HARDY FRAME® INSTALLED ON FOUNDATION
ALLOW VALUES PER TABLE 1-SJ

HF1



FOR 6x PORTAL HEADER
SEE DETAIL 5-HF2-SJ FOR
SECTION VIEW



SELECTING A PANEL INSTALLATION

- EMBED
- BASE CONNECTION
- TOP CONNECTION
- FLOOR SYSTEMS

BY ENGINEER OF RECORD

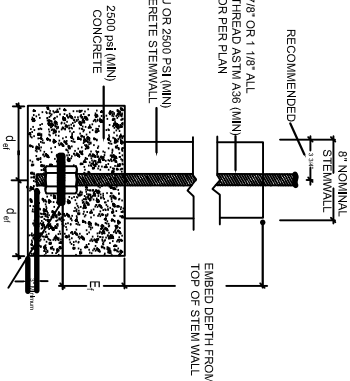
HF1-SJ FOUNDATION DETAILS

HF2-SJ FRAMING DETAILS

HF1

HF2

FIGURE 3 OF RECORD IS PREPARED TO ACCOMPANY THIS
DETAIL TO ACCOMMODATE A SPECIFIC CONDITION



NOTE:
ALL EMBED DIMENSIONS
Hardy Frame® BOLT BRACE (HFXB)
ARE TO BE PER PLANS
OR 1/2"x3"x3" PLATE WASHERS.

HARDY FRAME® HOLD DOWN AT STEW WALL

HF3D

HF3D

HARDY FRAMES
A MiTek Company

789 S. VICTORIA AVE., SUITE 200, VENTURA, CA 93003
TELEPHONE: 800 754–3030 / www.hardyframe.com

DATE:

4/23/2008

HF1–SJ

FDN

<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME® BRACE FRAME WITH 2X FILLER</div> <div>FIG. 3-4</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME® BRACE FRAME AT TOP PLATES</div> <div>FIG. 3-5</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME® ON FOUNDATION</div> <div>FIG. 3-6</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME® BRACE FRAME WITH 4X FILLER</div> <div>FIG. 3-7</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>BRACE FRAMES ON FOUNDATIONS</div> <div>FIG. 3-8</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME 1/4\"/> <div>FIG. 3-9</div> </div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>SELECTING A BRACE FRAME INSTALLATION</div> <div>FIG. 3-10</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>BOLT SCREW PATTERN FOR 32</div> <div>FIG. 3-11</div>	<div>ENGINEER OF RECORD IS PERMITTED TO MODIFY THIS DETAIL TO ACCOMMODATE A SPECIFIC CONDITION</div> <div>HARDY FRAME 1/4\"/> <div>FIG. 3-12</div> </div>	<div> <div> <div>REVISIONS</div> <div>DATE</div> </div> <div> <div>DATE:</div> <div>4/23/2008</div> </div> <div> <div>HF3-SJ</div> <div>FDN</div> </div> <div> <div>Brace Frame—Typ Foundation Dtls</div> <div>789 S. VICTORIA AVE., SUITE 200, VENTURA, CA 93003</div> <div>TELEPHONE: 800 754-3030 / www.hardyframe.com</div> </div> </div>
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